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㉓ Liquid detergent composition containing enzyme and enzyme stabilization system.

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EP-A- 88 511	EP-A- 126 505
EP-A- 293 040	EP-A- 294 904
EP-A- 378 262	GB-A- 2 126 242

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Description

The present invention relates to a stabilization system for detergent enzymes. More particularly, it relates to a stabilization system for detergent enzymes in an aqueous liquid detergent composition which further contains a peroxygen bleach.

EP-A-293 040 and EP-A-294 904 disclose bleach-containing liquid detergent compositions designed to limit the amount of available oxygen in solution. Said compositions further comprise formic acid as an enzymatic stabilizing agent.

EP 28 865 discloses a stabilization system for enzymes in a liquid detergent composition comprising formic acid or a salt thereof and calcium ions. The disclosed compositions have a pH of from 6.5 to 8.5.

EP-A-86 511 discloses the use of carboxylic acids having from one to three carbon atoms, in particular formic acid, in an oxygen bleach-containing liquid detergent composition.

EP-A-126 505 discloses an aqueous enzymatic liquid detergent composition which contains as an enzyme stabilizing system a mixture of boric acid, boric oxide, and/or alkali metal borate with a dicarboxylic acid. Succinic acid is the preferred dicarboxylic acid to be used therein.

Unless otherwise specified, all percentages in the following are by weight.

The present invention relates to aqueous liquid detergent compositions having a pH of at least 8.5 comprising from 5 % to 60 % of an organic surfactant; from 1 % to 40 % of a peroxygen compound; a detergent enzyme; characterized in that it further comprises, as an enzyme stabilizing system, from 0.01 % to 15 % of a carboxylic acid being selected from the group consisting of acetic acid, propionic acid, adipic acid, and mixtures of said acids.

Preferred compositions have a pH of at least 8.5, more preferably at least 9.0, most preferably at least 9.5. The peroxygen compound preferably is a perborate, most preferably perborate tetrahydrate.

Preferred composition contain a water-miscible organic solvent such as ethanol. This reduces the solubility of any dispersed peroxygen compound, resulting in a low level of available oxygen in the liquid phase that is controlled to be under 0.5 %, preferably below 0.1 %.

The amount of carboxylic acid enzyme stabilizer preferably is from 0.5% to 10%, most preferably from 1% to 7.5%. Most preferred enzyme stabilizer is adipic acid. According to the invention, mixture of these acids with formate is also suitable

Suitable detergent enzymes include detergent proteases, detergent amylases, detergent lipases and detergent cellulases. Preferred detergent compositions herein are those that contain a detergent protease, preferably a high alkaline protease, from 0.01 % to 5 % on 8 KNPU/g basis, most preferably from 0.05 % to 2.5 %

The detergent compositions optionally contain, as a second enzyme stabilizer, from 0.01 % to 5 % magnesium ions, preferably from 0.1 % to 0.5 %.

In spite of their rapidly growing popularity, liquid detergent compositions available to date do not fully match the performance profile of high quality granular detergents, particularly of those containing a peroxygen bleach and detergent enzymes. It is, therefore, desirable to provide liquid detergent compositions that contain both a peroxygen bleach and detergent enzymes. Ways of doing so have been provided in our earlier patent application, EP-A-293-040

It has now been found that detergent enzymes present in aqueous, peroxygen bleach-containing liquid detergents are subject to two types of deactivation mechanisms. The first mechanism involves auto-hydrolysis of the enzyme, and could be referred to as autolysis. This type of deactivation is rather well known in the detergent industry, and several enzyme stabilization systems have been proposed to reduce its effects. Autolysis becomes more of a problem as the pH of the liquid detergent composition increases. On the other hand, a high pH is conducive to a good performance of the peroxygen bleach.

The second mechanism of enzyme deactivation involves the oxidation of certain amino acids in the enzyme. This mechanism is specific to liquid detergents containing peroxygen bleach upon storage, and has heretofore not been recognized in the detergent industry.

An enzyme stabilization system for use in aqueous liquid detergent compositions which contain a peroxygen bleach should protect the enzyme against both autolysis and oxidative deactivation. Formic acid appears to protect against autolysis, but not against oxidative deactivation.

It has now surprisingly been found that certain carboxylic acids such as acetic acid, propionic acid, adipic acid or mixture of said acids, protect enzymes against both oxidative deactivation and autolysis. Of course, these carboxylic acids become partially or totally deprotonated at the pH of the detergent composition, particularly when the pH of the composition is greater than 8.5, as is preferred for peroxygen bleach performance. Unless stated otherwise, the word "carboxylic acid" as used herein encompasses the deprotonated species and salts as well. The percentages herein are weight percentages, calculated on the

basis of the protonated acid.

In practice, the acid or a water-soluble salt of the acid is added to the composition, and the composition's pH is adjusted to its desired value, using customary alkaline or acidic materials, as the case may be. As an alternative, the acid or its water soluble salt may be premixed with the enzyme hereinafter described, before being introduced into the composition. Said premix may also be evaporated or lyophilized so as to obtain solid particles which may be coated with, e.g. silicone oil. For the present purposes, the enzyme stabilizing compound will be referred to as the acid, even if it is present or added in the form of one of its salts.

It is understood that, according to the invention, mixtures of said acids can also be used.

It is also possible to premix the acid with the enzyme and then add the premix to the composition; in that case, lower acid concentrations can be obtained in the final compositions.

The liquid detergent compositions herein all contain from 5 % to 60 % by weight of the liquid detergent composition, preferably from 15 % to 40 % of an organic surface-active agent selected from nonionic, anionic, cationic, and zwitterionic surface-active agents and mixtures thereof.

Synthetic anionic surfactants can be represented by the general formula R_1SO_3M wherein R_1 represents a hydrocarbon group selected from the group consisting of straight or branched alkyl radicals containing from about 8 to about 24 carbon atoms and alkyl phenyl radicals containing from about 9 to about 15 carbon atoms in the alkyl group. M is a salt-forming cation which is typically selected from the group consisting of sodium, potassium, ammonium, and mixtures thereof.

A preferred synthetic anionic surfactant is a water-soluble salt of an alkylbenzene sulfonic acid containing from 9 to 15 carbon atoms in the alkyl group. Another preferred synthetic anionic surfactant is a water-soluble salt of an alkyl sulfate or an alkyl polyethoxylate ether sulfate wherein the alkyl group contains from about 8 to about 24, preferably from about 10 to about 18 carbon atoms and there are from about 1 to about 20, preferably from 1 to about 12 ethoxy groups. Other suitable anionic surfactants are disclosed in U.S. Patent 4,170,565, Flesher et al., issued October 9, 1979.

The nonionic surfactants are conventionally produced by condensing ethylene oxide with a hydrocarbon having a reactive hydrogen atom, e.g. a hydroxyl, carboxyl, or amino group, in the presence of an acidic or basic catalyst, and include compounds having the general formula $RA(CH_2CH_2O)_nH$ wherein R represents the hydrophobic moiety, A represents the group carrying the reactive hydrogen atom and n represents the average number of ethylene oxide moieties. R typically contains from about 8 to 22 carbon atoms. They can also be formed by the condensation of propylene oxide with a lower molecular weight compound, n usually varies from about 2 to about 24.

The hydrophobic moiety of the nonionic compound is preferably a primary or secondary, straight or branched, aliphatic alcohol having from about 8 to 24, preferably from about 12 to about 20 carbon atoms.

A more complete disclosure of suitable nonionic surfactants can be found in U.S. Patent 4,111,855. Mixtures of nonionic surfactants can be desirable.

Suitable cationic surfactants include quaternary ammonium compounds of the formula $R_1R_2R_3R_4N^+$ where R_1 , R_2 , and R_3 are methyl groups and R_4 is a C_{12} - C_{15} alkyl group, or where R_1 is an ethyl or hydroxy ethyl group, R_2 and R_3 are methyl groups and R_4 is a C_{12} - C_{15} alkyl group.

Zwitterionic surfactants include derivatives of aliphatic quaternary ammonium, phosphonium, and sulphonium compounds in which the aliphatic moiety can be a straight or branched chain and wherein one of the aliphatic substituents contains from about 8 to about 24 carbon atoms and another substituent contains, at least, an anionic water-solubilizing group. Particularly preferred zwitterionic materials are the ethoxylated ammoniumsulfonates and sulfates disclosed in U.S. Patents 3,925,262, Laughlin et al., issued December 9, 1975 and 3,929,678, Laughlin et al., issued December 30, 1975.

Semi-polar nonionic surfactants include water-soluble amine oxides containing one alkyl or hydroxy alkyl moiety of from about 8 to about 28 carbon atoms and two moieties selected from the group consisting of alkyl groups and hydroxy alkyl groups, containing from 1 to about 3 carbon atoms which can optionally be joined into ring structures.

Suitable anionic synthetic surface-active salts are selected from the group of sulfonates and sulfates. The like anionic detergents are well-known in the detergent arts and have found wide-spread application in commercial detergents. Preferred anionic synthetic water-soluble sulfonate or sulfate salts have in their molecular structure an alkyl radical containing from about 8 to about 22 carbon atoms.

Examples of such preferred anionic surfactant salts are the reaction products obtained by sulfating C_8 - C_{18} fatty alcohols derived from tallow and coconut oil; alkylbenzene sulfonates wherein the alkyl group contains from about 9 to 15 carbon atoms; sodium alkylglyceryl ether sulfonates; ether sulfates of fatty alcohols derived from tallow and coconut oils; coconut fatty acid monoglyceride sulfates and sulfonates; and water-soluble salts of paraffin sulfonates having from about 8 to about 22 carbon atoms in the alkyl chain.

Sulfonated olefin surfactants as more fully described in e.g. U.S. Patent Specification 3,332,880 can also be used. The neutralizing cation for the anionic synthetic sulfonates and/or sulfates is represented by conventional cations which are widely used in detergent technology such as sodium and potassium.

A particularly preferred anionic synthetic surfactant component herein is represented by the water-soluble salts of an alkylbenzene sulfonic acid, preferably sodium alkylbenzene sulfonates having from about 10 to 13 carbon atoms in the alkyl group.

A preferred class of nonionic ethoxylates is represented by the condensation product of a fatty alcohol having from 12 to 15 carbon atoms and from about 2 to 10, preferably 3 to 7 moles of ethylene oxide per mole of fatty alcohol. Suitable species of this class of ethoxylates include : the condensation product of C₁₂-C₁₅ oxo-alcohols and 7 moles of ethylene oxide per mole of alcohol; the condensation product of narrow cut C₁₄-C₁₅ oxo-alcohols and 7 or 9 moles of ethylene oxide per mole of fatty(oxo)alcohol; the condensation product of a narrow cut C₁₂-C₁₃ fatty(oxo)alcohol and 6.5 moles of ethylene oxide per mole of fatty alcohol; and the condensation products of a C₁₀-C₁₄ coconut fatty alcohol with a degree of ethoxylation (moles EO/mole fatty alcohol) in the range from 5 to 8. The fatty oxo alcohols while mainly linear can have, depending upon the processing conditions and raw material olefins, a certain degree of branching, particularly short chain such as methyl branching.

A degree of branching in the range from 15 % to 50 % (weight%) is frequently found in commercial oxo alcohols.

Preferred nonionic ethoxylated components can also be represented by a mixture of 2 separately ethoxylated nonionic surfactants having a different degree of ethoxylation. For example, the nonionic ethoxylate surfactant containing from 3 to 7 moles of ethylene oxide per mole of hydrophobic moiety and a second ethoxylated species having from 8 to 14 moles of ethylene oxide per mole of hydrophobic moiety. A preferred nonionic ethoxylated mixture contains a lower ethoxylate which is the condensation product of a C₁₂-C₁₅ oxo-alcohol, with up to 50 % (wt) branching, and from about 3 to 7 moles of ethylene oxide per mole of fatty oxo-alcohol, and a higher ethoxylate which is the condensation product of a C₁₆-C₁₉ oxo-alcohol with more than 50 % (wt) branching and from about 8 to 14 moles of ethylene oxide per mole of branched oxo-alcohol.

Suitable bleaches in the present compositions are solid, water-soluble peroxogen compounds. Preferred compounds include perborates, persulfates, peroxydisulfates, perphosphates and the crystalline peroxhydrates formed by reacting hydrogen peroxide with sodium carbonate or urea. Preferred peroxogen bleach compounds are sodium perborate monohydrate and sodium perborate tetrahydrate and sodium percarbonate. Perborate bleaches in the present composition can be in the form of small particles i.e. from 0,1 to 20 micrometers, said particles having been formed by *in situ* crystallization of the perborate.

The term "in situ crystallization" relates to processes whereby perborate particles are formed from larger particles or from solution, in the presence of the water/anionic surfactant/detergent builder matrix. This term therefore encompasses processes involving chemical reactions, as when sodium perborate is formed by reacting stoichiometric amounts of hydrogen peroxide and sodium metaborate or borax. It also encompasses processes involving dissolution and recrystallization, as in the dissolution of perborate monohydrate and subsequent formation of perborate tetrahydrate. Recrystallization may also take place by allowing perborate monohydrate to take up crystal water, whereby the monohydrate directly recrystallizes into the tetrahydrate, without dissolution step.

In one embodiment of the invention, a perborate compound, e.g., sodium perborate monohydrate, is added to an aqueous liquid comprising the anionic surfactant and the detergent builder. The resulting slurry is stirred. During this stirring the perborate compound undergoes a process of dissolution/recrystallization. Due to the presence of the anionic surfactant and the detergent builder this dissolution/recrystallization process results in particles having the desired particle diameter.

As the monohydrate is more susceptible to recrystallization, the monohydrate is preferred for this embodiment of the invention. Particle diameters herein are weight average particle diameters, unless otherwise specified. For reasons of physical stability it is preferred that the particle size distribution is relatively narrow; i.e., it is preferred that less than 10 % (wt) has a particle diameter greater than 10 micrometers.

In a second embodiment of the invention the perborate compound is formed *in situ* by chemical reaction. For example, sodium metaborate is added to an aqueous liquid comprising the anionic surfactant and the detergent builder. Then a stoichiometric amount of hydrogen peroxide is added while stirring. Stirring is continued until the reaction is complete.

Instead of metaborate, other borate compounds, including e.g., borax and boric acid can be used. If borax is used as the boron compound, a stoichiometric amount of a base, e.g. sodium hydroxide, is added to ensure reaction of the borax to metaborate. The process then proceeds as described hereinabove for

metaborate conversion. Instead of hydrogen peroxide, other peroxides may be used (e.g., sodium peroxide), as known in the art.

Preferred liquid detergent compositions contain, in addition to water, a water-miscible organic solvent. The solvent reduces the solubility of perborate in the liquid phase and thereby enhances the chemical stability of the composition.

It is not necessary that the organic solvent be fully miscible with water, provided that enough of the solvent mixes with the water of the composition to affect the solubility of the perborate compound in the liquid phase.

The water-miscible organic solvent must, of course be compatible with the perborate compound at the pH that is used. Therefore, polyalcohols having vicinal hydroxy groups (e.g. 1,2-propanediol and glycerol) are less desirable.

Examples of suitable water-miscible organic solvents include the lower aliphatic monoalcohols, and ethers of diethylene glycol and lower monoaliphatic monoalcohols. Preferred solvents are ethanol, isopropanol, 1-methoxy, 2-propanol, butyldiglycoether and ethyldiglycoether.

The compositions according to the invention also contain detergent enzymes; suitable enzymes include the detergent proteases, amylases, lipases, cellulases and mixtures thereof. Preferred enzymes are high alkaline proteases e.g. Maxacal (R) and Savinase (R). Silicone-coated enzymes, as described in EP-A-0238216 can also be used.

Preferred compositions herein optionally contain as a builder a fatty acid component. Preferably, however, the amount of fatty acid is less than 5 % by weight of the composition, more preferably less than 4 %. Preferred saturated fatty acids have from 10 to 16, more preferably 12 to 14 carbon atoms. Preferred unsaturated fatty acids are oleic acid and palmitoleic acid.

Preferred compositions contain an inorganic or organic builder. Examples of inorganic builders include the phosphorous-based builders, e.g., sodium tripolyphosphate, sodium pyrophosphate, and aluminosilicates (zeolites).

Examples of organic builders are represented by polycarboxyls such as citric acid, nitrilotriacetic acid, and mixtures of tartrate monosuccinate with tartrate disuccinate. Preferred builders for use herein are citric acid and alk(en)yI-substituted succinic acid compounds, wherein alk(en)yI contains from 10 to 16 carbon atoms. An example of this group of compounds is dodecyl succinic acid. Polymeric carboxylate builders inclusive of polyacrylates, polyhydroxy acrylates and polyacrylates/polymaleates copolymers can also be used.

The compositions herein can contain a series of further optional ingredients which are mostly used in additive levels, usually below about 5 %. Examples of the like additives include : suds regulants, opacifiers, agents to improve the machine compatibility in relation to enamel-coated surfaces, bactericides, dyes, perfumes, brighteners and the like.

The liquid compositions herein can contain further additives of a level from 0,05 % to 5 %.

These additives include polyaminocarboxylates such as ethylenediaminetetraacetic acid, diethylenetriaminopentacetic acid, ethylenediamino disuccinic acid or the water-soluble alkali metals thereof. Other additives include organo-phosphonic acids; particularly preferred are ethylenediamino tetramethyleneephosphonic acid, hexamethylenediamino tetramethyleneephosphonic acid, diethylenetriaminopentamethyleneephosphonic acid and aminotrimethyleneephosphonic acid.

Bleach stabilizers such as ascorbic acid, dipicolinic acid, sodium stannates and 8-hydroxyquinoline can also be included in these compositions, at levels from 0.01 % to 1 %.

The beneficial utilization of the claimed compositions under various usage conditions can require the utilization of a suds regulant. While generally all detergent suds regulants can be utilized preferred for use herein are alkylated polysiloxanes such as dimethylpolysiloxane also frequently termed silicones. The silicones are frequently used in a level not exceeding 1.5 %, most preferably from 0.1 % to 1.0 %.

It can also be desirable to utilize opacifiers in as much as they contribute to create a uniform appearance of the concentrated liquid detergent compositions. Examples of suitable opacifiers include : polystyrene commercially known as LYTRON® 621 manufactured by MONSANTO CHEMICAL CORPORATION. The opacifiers are frequently used in an amount from 0.3 % to 1.5 %.

The liquid detergent compositions of this invention can further comprise an agent to improve the washing machine compatibility, particularly in relation to enamel-coated surfaces.

It can further be desirable to add from 0.1 % to 5 % of known antiredeposition and/or compatibilizing agents. Examples of the like additives include : sodium carboxymethylcellulose; hydroxy-C₁-₆-alkylcellulose; polycarboxylic homo- or copolymeric ingredients, such as : polymaleic acid; a copolymer of maleic anhydride and methylvinylether in a molar ratio of 2:1 to 1:2; and a copolymer of an ethylenically unsaturated monocarboxylic acid monomer, having not more than 5, preferably 3 or 4 carbon atoms, for

example (meth)-acrylic acid, and an ethylenically unsaturated dicarboxylic acid monomer having not more than 6, preferably 4 carbon atoms, whereby the molar ratio of the monomers is in the range from 1:4 to 4:1, said copolymer being described in more detail in European Patent Application 0 066 915, filed May 17, 1982.

5 The following examples illustrate the invention and facilitate its understanding.

Liquid detergent compositions were prepared by mixing the listed ingredients in the stated proportions. The pH of these compositions is in the range of from 9.5 to 10.5.

INGREDIENTS	COMPOSITION (by weight %)				
	I	II	III	IV	V
Water	28.5	29.0	26.0	27.5	25.5
Ethanol	13.0	12.0	13.0	10.0	10.0
Linear dodecylbenzene sulfonic acid	9.0	9.0	9.0	9.0	9.0
Sodium cocoyl sulfate	1.0	1.0	1.0	1.0	1.0
Condensation product of 1 mole of C ₁₂ -C ₁₅ oxacolohol and 7 moles of ethylene oxide					
Condensation product of 1 mole of C ₁₂ -C ₁₅ oxacolohol and 5 moles of ethylene oxide					
C ₁₂ -C ₁₅ (2-hydroxyethyl) dimethyl ammonium chloride					
Dodecylsuccinic acid	7.0	7.0	7.0	7.0	7.0
Dodecetyl-Tetradecenyl succinic acid	12.5	12.5	12.5	12.5	12.5
Coconut fatty acid					
TMS/TDS					15.0
Sodium tripolyphosphate					
Zeolite	0.8	1.0	0.8	3.0	15.0
Citric acid	3.0	3.0	3.0	3.0	3.0
Oilic acid					
Diethylene triamine penta-methylene phosphonic acid	0.7	0.7	0.7	0.7	0.7
Hexamethylene diaminetetra(methylene phosphonic acid)					
Sodium perborate monohydrate					
Protease 8KNP/5	14.5	14.5	14.5	14.5	14.5
Protease 16KNP/9	0.6	0.6	0.6	0.6	0.3
Amylase					
Sodium formate	0.2	0.2	0.2	0.2	0.2
Sodium acetate	1.0	1.0	1.0	1.0	1.0
Sodium propionate	2.5	2.5	2.5	2.5	2.5
Adipic acid					
Magnesium acetate tetrahydrate					
Sodium hydroxide	5.0	5.0	5.0	5.0	5.0
Perfume and minors					
				balance	

** (80:20) mixture of tartrate monosuccinate/tartrate disuccinate

INGREDIENTS	COMPOSITION (by weight %)						XII
	VI	VII	VIII	IX	X	XI	
Water							
Ethanol							
Linear dodecylbenzene sulfonic acid	31.0	37.0	24.5	32.5	31.0	35.5	31.5
Sodium cocoyl sulfate	8.0	8.0	12.0	8.0	13.0	8.0	10.0
Condensation product of 1 mole of oxacolanol and 7 moles of ethylene oxide	9.0	9.0	9.0	9.0	19.0	9.0	19.0
Condensation product of 1 mole of oxacolanol and 5 moles of ethylene oxide							
C ₁ -C ₅ aliphatic acid	7.0	7.0	7.0	7.0	7.0	7.0	7.0
C ₁₂ -C ₁₄ (2-hydroxyethyl) dimethyl ammonium chloride	0.5	0.5	0.5	1.0	0.5	0.5	1.0
Dodecylsuccinic acid							
Dodecylsuccinic acid	10.0		15.0		10.0		10.0
Coconut fatty acid							
TNS/TNS sodium tripolyphosphate	15.0	3.0	3.0	3.0	3.0	3.0	3.0
Zeolite	3.0						
Citric acid							
Stearyl acid							
Diethylene triamine penta-methylenetriamine diaminocetate	0.7						
Hexadecylbenzene phosphonic acid ¹³							
Hexadecylbenzene phosphonic acid ¹⁴	0.7	14.5	14.5	0.7	0.7	14.5	14.5
Sodium perborate monohydrate	14.5						
Protease 6000U/g	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Protease 16KNU/g							
Amylase							
Sodium formate	2.0	1.5	0.5	0.2	0.2	0.2	0.2
Sodium acetate	2.5	2.5	2.5	5.0	2.5	2.5	2.5
Sodium propionate							
Adipic acid				2.5	2.5	2.5	2.5
Magnesium acetate tetrahydrate							
Sodium hydroxide	1.7	5.0	5.0	5.0	5.0	5.0	5.0
Perfume and minors							
						balance	5.0

* * (80:20) mixture of tartate monosuccinate/tartarate disuccinate

Claims

55 1. An aqueous liquid detergent composition having a pH of at least 8.5 comprising organic surfactants; a peroxygen bleach compound; a detergent enzyme; characterized in that it further comprises, as an enzyme stabilizing system, from 0.01% to 15% of a carboxylic acid being selected from the group consisting of acetic acid, propionic acid, adipic acid, or mixtures of said acids.

2. An aqueous liquid detergent composition according to Claim 1, having a pH of at least 9.0, most preferably at least 9.5.
3. An aqueous liquid detergent composition according to Claim 1 or 2 wherein the peroxygen compound is a perborate.
4. An aqueous liquid detergent composition according to Claim 1 or 2 wherein the peroxygen compound is a percarbonate.
10. An aqueous liquid detergent composition according to Claim 3, comprising a water-miscible organic solvent such that the perborate compound is present as a dispersion of solid particles and the amount of available oxygen in solution is less than 0.5 %, preferably less than 0.1 %.
15. An aqueous liquid detergent composition according to any one of the preceding claims, wherein the amount of the carboxylic acid enzyme stabilizer is from 0.01 % to 10 %, preferably from 0.1 % to 7.5 %.
20. An aqueous liquid detergent composition according to any one of the preceding claims wherein formate is added to the carboxylic acid enzyme stabilizer or to mixtures thereof.
25. An aqueous liquid detergent composition according to anyone of the preceding claims wherein the detergent enzyme is selected from the group consisting of detergent proteases, detergent amylases, detergent lipases, detergent cellulases, and mixtures thereof.
30. An aqueous liquid detergent composition according to Claim 8 wherein the detergent enzyme comprises detergent protease, preferably high alkaline protease.
35. An aqueous detergent composition according to any one of Claims 2-9, comprising, as a second enzyme stabilizer, from 0.01 % to 5 % magnesium ions.

Patentansprüche

1. Wässrige flüssige Waschmittelzusammensetzung mit einem pH von mindestens 8,5, umfassend organische Tenside; eine Peroxid-Bleichmittelverbindung; ein Waschmittelenzym; **dadurch gekennzeichnet**, daß sie weiterhin als ein Enzymstabilisierungssystem 0,01% bis 15% einer Carbonsäure enthält, welche aus der aus Essigsäure, Propionsäure, Adipinsäure oder Mischungen dieser Säuren bestehenden Gruppe gewählt ist.
2. Wässrige flüssige Waschmittelzusammensetzung nach Anspruch 1 mit einem pH von mindestens 9.0, am bevorzugtesten mindestens 9.5.
3. Wässrige flüssige Waschmittelzusammensetzung nach Anspruch 1 oder 2, wobei die Peroxidverbindung ein Perborat ist.
4. Wässrige flüssige Waschmittelzusammensetzung nach Anspruch 1 oder 2, wobei die Peroxidverbindung ein Percarbonat ist.
5. Wässrige flüssige Waschmittelzusammensetzung nach Anspruch 3, umfassend ein wasserlösliches organisches Lösungsmittel, so daß die Perboratverbindung als Dispersion fester Teilchen vorliegt und die Menge des in Lösung verfügbaren Sauerstoffs weniger als 0,5%, vorzugsweise weniger als 0,1% beträgt.
6. Wässrige flüssige Waschmittelzusammensetzung nach mindestens einem der vorangehenden Ansprüche, wobei die Menge des Carbonsäure-Enzymstabilisators 0,01% bis 10%, vorzugsweise 0,1% bis 7,5% beträgt.
7. Wässrige flüssige Waschmittelzusammensetzung nach mindestens einem der vorangehenden Ansprüche, wobei dem Carbonsäure-Enzymstabilisator oder Mischungen hiervon ein Formiat zugesetzt wird.

8. Wäbrige flüssige Waschmittelzusammensetzung nach mindestens einem der vorangehenden Ansprüche, wobei das Waschmittelenzym aus der aus Waschmittelproteasen, Waschmittelylasen, Waschmittellipasen, Waschmittelcellulasen und Mischungen hiervon bestehenden Gruppe gewählt ist.
- 5 9. Wäbrige flüssige Waschmittelzusammensetzung nach Anspruch 8, wobei das Waschmittelenzym Waschmittelprotease, vorzugsweise hoch alkalische Protease umfaßt.
10. Wäbrige Waschmittelzusammensetzung nach mindestens einem der Ansprüche 2-9, umfassend als einen zweiten Enzymstabilisator 0,01% bis 5% Magnesiumionen.

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Revendications

1. Composition détergente liquide aqueuse ayant un pH d'au moins 8,5, comprenant des tensioactifs organiques; un composé de blanchiment peroxygéné; une enzyme détergente; caractérisée en ce qu'elle comprend aussi, comme système stabilisateur d'enzyme, de 0,01% à 15% d'un acide carboxylique choisi dans le groupe constitué par l'acide acétique, l'acide propionique, l'acide adipique, ou des mélanges desdits acides.
2. Composition détergente liquide aqueuse selon la revendication 1, ayant un pH d'au moins 9,0, mieux encore d'au moins 9,5.
3. Composition détergente liquide aqueuse selon la revendication 1 ou 2, dans laquelle le composé peroxygéné est un perborate.
- 25 4. Composition détergente liquide aqueuse selon la revendication 1 ou 2, dans laquelle le composé peroxygéné est un percarbonate.
5. Composition détergente liquide aqueuse selon la revendication 3, comprenant un solvant organique miscible avec l'eau, telle que le composé perborate est présent sous forme d'une dispersion de particules solides et que la quantité d'oxygène actif en solution est inférieure à 0,5 %, de préférence inférieure à 0,1 %.
- 35 6. Composition détergente liquide aqueuse selon l'une quelconque des revendications précédentes, dans laquelle la quantité de l'acide carboxylique stabilisateur d'enzyme est de 0,01 % à 10 %, de préférence de 0,1 % à 7,5 %.
7. Composition détergente liquide aqueuse selon l'une quelconque des revendications précédentes, dans laquelle du formiate est ajouté à l'acide carboxylique stabilisateur d'enzyme ou aux mélanges d'acides.
- 40 8. Composition détergente liquide aqueuse selon l'une quelconque des revendications précédentes, dans laquelle l'enzyme détergente est choisie dans le groupe constitué par les protéases détergentes, les amylases détergentes, les lipases détergentes, les cellulases détergentes et leurs mélanges.
9. Composition détergente liquide aqueuse selon la revendication 8, dans laquelle l'enzyme détergente comprend une protéase détergente, de préférence une protéase hautement alcaline.
- 45 10. Composition détergente liquide aqueuse selon l'une quelconque des revendications 2-9, comprenant, comme second stabilisateur d'enzyme, de 0,01 % à 5 % d'ions magnésium.

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